

CALIFORNIA STATE MINING BUREAU

FERRY BUILDING, SAN FRANCISCO

FLETCHER HAMILTON

State Mineralogist

San Francisco]

PRELIMINARY REPORT No. 3

[September, 1917

Manganese and Chromium

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CALIFORNIA STATE PRINTING OFFICE

SACRAMENTO

1917

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COMPLIMENTS OF
FLETCHER HAMILTON
STATE MINERALOGIST

By E. S. BOALICH



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TABLE OF CONTENTS.

	PAGE
LETTER OF TRANSMITTAL-----	5
CHAPTER 1. MANGANESE.	
OCCURRENCE -----	7
USES -----	7
PRICES -----	8
FREIGHT RATES -----	8
OWNERS AND OPERATORS IN CALIFORNIA-----	8
MANGANESE CONSUMERS -----	10
Letters from -----	11
U. S. GEOLOGICAL SURVEY LIST OF PURCHASERS-----	17
CHAPTER II. CHROMIUM.	
OCCURRENCE -----	20
CONCENTRATION OF ORE -----	20
USES -----	21
PRICES -----	21
FREIGHT RATES -----	21
OWNERS AND OPERATORS IN CALIFORNIA-----	22
CHROME BUYERS AND CONSUMERS-----	25
Letters from -----	26
APPENDIX.	
LIST OF PUBLICATIONS OF STATE MINING BUREAU-----	30
DETERMINATION OF MINERAL SAMPLES-----	32
ILLUSTRATION.	
MILL OF PLACER CHROME CONCENTRATING COMPANY, RATTLESNAKE BAR, EL DORADO COUNTY -----	20

LETTER OF TRANSMITTAL.

October 15, 1917.

To His Excellency, THE HONORABLE WILLIAM D. STEPHENS,
Governor of California.

SIR: As a result of present transportation conditions a serious shortage exists in the supply of many mineral substances which were formerly imported, and which are vitally important in the manufacture of munitions and in other industries. The necessity of taking a careful inventory of the nation's resources is rapidly dawning on the mining public. Facts relative to the location of ore deposits, difficulties which must be overcome to make them available for use, and methods to be employed, if their immediate development is demanded, must be correlated.

With the idea in view of rendering all possible assistance in the development of this particular branch of the mining industry, the California State Mining Bureau took up a thorough investigation of manganese and chromium deposits in the state soon after the declaration of war with Germany. The field work has been practically completed, and a detailed report will be made available for distribution at the earliest possible moment. While such report is in course of preparation, it has been deemed advisable to place in form for immediate reference the following data, which it is hoped, will be of material assistance to all parties interested in this branch of the mining industry. This information will be of direct benefit to the United States Government, at this time of national stress.

Respectfully submitted.

FLETCHER HAMILTON,
State Mineralogist.

CHAPTER I.

MANGANESE.

Occurrence.

According to Harder¹, the characteristic occurrence of manganese in California is in the form of porous black oxide, associated as layers and pockets with the jasper lenses of the Franciscan formation of the Coast Ranges. Smaller deposits are found in the Sierra Nevadas, in veins in the Calaveras formation, as fragments disseminated in auriferous gravels, or in deposits associated with igneous rocks.

Recent investigations made by field assistants of this bureau have fully corroborated the above opinion, although in addition to the examples cited some important deposits of this mineral have been found to occur, in Inyo and San Bernardino Counties, as replacements in limestone or along contacts between limestone and granite. The deeper workings of the Ladd and Merchant Mines in San Joaquin and Alameda Counties are yielding the gray carbonate of manganese, rhodochrosite, as a commercial ore.

Uses.

A large proportion of manganese consumed in the United States has always gone into the manufacture of ferro-manganese, which is employed in the steel industry. This use is of course more important at the present time than ever before, as the steel alloy containing manganese is particularly important in the manufacture of armor plate, as well as munitions and other war supplies.

This material is also in demand in much lesser degree by manufacturers of glass, electric dry batteries, paints, pottery, tile and brick. These chemical uses require, as a rule, a much higher grade of ore than does the steel industry. The ores best adapted for use in the steel industry should contain more than 40 per cent manganese, and with the exception of phosphorus and silica, no other elements that are commonly present interfere with the use of the ore for this purpose. It is usually specified that ore containing more than 8 per cent silica and two-tenths of 1 per cent phosphorus, is not satisfactory. In the manufacture of dry batteries the usual specifications are that the ore must contain at least 80 per cent manganese dioxide, less than 1 per cent iron, and less than 5 per cent copper, nickel or cobalt. Ore containing more than 1 per cent iron is not adaptable for use in the manufacture of flint glass. Detailed specifications, as required by various consumers in the United States, are given on page 11.

¹Harder, E. C., U. S. Geol. Sur., Bull. 427; "Manganese Deposits of the United States."

Price.

The average value of manganese ores up to January, 1916, were approximately from \$10 to \$20 a ton, but since that time the curtailment of ferro-manganese imports from England, and the increased demand has caused the price to rapidly rise, and the New York quotation as of October 20, 1917, was \$1.00 per unit for 48 per cent grade, with the chemical ore at from 5 to 7 cents a pound, according to grade. This feature is, of course, one which is liable to wide variation, and information regarding prices should be kept up to date by reference from time to time to the columns of the current technical magazines or trade journals.

Freight Rates.

The market for the bulk of the manganese ore produced in California is at the steel producing centers of the East, although a considerable quantity of this material has recently been purchased by local firms. Freight rates on this class of material from various points in California to Chicago are approximately \$10 per ton, or \$14.86 to the eastern seaboard.

OWNERS AND OPERATORS OF MANGANESE DEPOSITS IN CALIFORNIA.

Producing:

Owner or operator	Address
Braitto, Fred E. and Mason, T. J.-----	Crescent Mills, Plumas County, Cal.
Busch, George H. (Independent Mine)-----	Potter Valley, Mendocino County, Cal.
Busch, G. H. and S. H.; and Bevins, A. P.; Potter Valley, Mendocino County, Cal.	
Holbrook, E. E.; Burris, S. C.; and Sites, H. W.-----	
-----	Potter Valley, Mendocino County, or 45 Kearny St., San Francisco, Cal.
Kloppenburger, H. A. and R. L.; and Myton, H. S.-----	Quincy, Plumas County, Cal.
Levensaler Speir Corporation-----	681 Market St., San Francisco, Cal.
Manganese Company of California-----	180 Sutter St., San Francisco, Cal.
McDonald, L. M.-----	Livermore, Alameda County, Cal.
Mineral Products Co.-----	334 Rialto Bldg., San Francisco, Cal.
Noble Electric Steel Co.-----	995 Market St., San Francisco, Cal.
Page, James E. (Lease of George Busch)-----	Willits, Mendocino County, Cal.
Ruhser, F. W., & Hubberty-----	Jackson, Amador County, Cal.
Seagrave, M. C. (Ladd Mine)-----	Balboa Bldg., San Francisco, Cal.
Shanks, D. W., and Copps, A. W.-----	Geyserville, Sonoma County, or 1302 Merchants National Bank Bldg., San Francisco, Cal.
Van, G. W. (Middle Creek Mine)-----	Upper Lake, Lake County, Cal.
Winship, K. D.-----	350 Post St., San Francisco, Cal.
Yeoman, Alex (Owl Hole Manganese Mine)-----	
-----	Silver Lake, San Bernardino County, Cal.

Developed:

Owner or operator	Address
Alf, Seymour & Garinger, I. D.-----	Daggett, San Bernardino County, Cal.
Beck, Mrs. E.-----	Fetters Springs, Sonoma County, Cal.
Binet, E. C.-----	Clipper Mills, Butte County, Cal.
Bocklin, Christ-----	616 Hobart St., Oakland, Cal.
Brereton, Chas. (Leased to Michaels, Roman and Weeks)-----	
-----	Covelo, Mendocino County, Cal.
Burrows, I. A.-----	Newville, Glenn County, Cal.

Developed:

Owner or operator	Address
Carter, Chas. P.	Elsinore, Riverside County, Cal.
Cary-Hoff Manganese Co.	Foot 22d St., Oakland, Cal.
Clark & McDonald	Livermore, Alameda County, Cal.
Clough, L. L.	Quincy, Plumas County, Cal.
Darling, H. F.	714 Wisconsin Ave., San Francisco, Cal.
Davis, John T.	1562 Lincoln Ave., Alameda, Alameda County, Cal.
Doak, W. C.	Rialto Bldg., San Francisco, Cal.
Evans, T. & J.	San Simeon, San Luis Obispo County, Cal.
Everett, Albert	Escondido, San Diego County, Cal.
Everhart, John J.	254 N. Soto St., Los Angeles, L. A. County, Cal.
Green, Thos. H.	R. F. D. No. 3, Hayward, Alameda County, Cal.
Hall, Fred W.	Box 153, Parker, Arizona
Hawkins, T. S.	Bank of Italy, Hollister, San Benito County, Cal.
Keeney, F. W.	Palace Hotel, Ukiah, Mendocino County, Cal.
Kinzie, Robert A.	First National Bank Bldg., San Francisco, Cal.
Lee, Dr. L.	Potter Valley, Mendocino County, Cal.
Livermore Manganese Co.	Rialto Bldg., San Francisco, Cal.
Lugo & Smith, Justus	Palo Verde, Riverside County, Cal.
Magneson, Geo. L.	Calpella, Mendocino County, Cal.
Martin, Hauser & Cheeseborough	1138 Oxford Ave., Los Angeles, L. A. County, Cal.
Mateos, John D.	165 N. 15th St., San Jose, Santa Clara County, Cal.
McLoughlin, Harry	952 Sutter St., San Francisco, Cal.
McPhail, Dan (Agent for Hendricks Mine)	Hollister, San Benito County, Cal.
Merchant, J. R.	Livermore, Alameda County, Cal.
Mitchell, Dave	Vernalis, San Joaquin County, Cal.
Mollet Development Co.	Massillon, Ohio
Newhall, E. P. & W. E.	Box 354, Livermore, Alameda County, Cal.
Newport, Sam	Perris, Riverside County, Cal.
Noyes, A. H.; Chase, H. B. and Norris, T. (Rattlesnake Mine)	-----
-----	Fruto, Glenn County, Cal., or Mechanics Institute, San Francisco, Cal.
Overacker, H. T.	Livermore, Alameda County, Cal.
Pacific Coast Manganese Co., Inc.	681 Market St., San Francisco, Cal.
Price, John E. & Co.	Hoge Bldg., Seattle, Wash.
Roman, G.	55 Montgomery St., San Francisco, Cal.
Schellenger, E. E.	Blythe, Riverside County, Cal.
Sehorn, A. W., et al. (Black Diamond Mine)	Willows, Glenn County, Cal.
Shasta National Copper Co.	924 Page St., San Francisco, Cal.
Shurick, K. C.	1111 Alice St., Oakland, Alameda County, Cal.
Stenton, Ruben	Silver Lake, San Bernardino County, Cal.
Talbot, J. C.	Dutch Flat, Placer County, Cal.
Thomas, W. P.	Ukiah, Mendocino County, Cal.
Van Winkle, Walton	2925 Garber St., Berkeley, Alameda County, Cal.
Weeks, Frank; Michaels and Roman (Lease from Brereton)	-----
-----	Covelo, Mendocino County, Cal.
Welte, G. H.	Riggs, San Bernardino County, Cal.
Western Manganese Co.	Balboa Bldg., San Francisco, Cal.
Wooley, George E.	Forbestown, Butte County, Cal.

Undeveloped:

Owner or operator	Address
American Manganese Co.	Ono, Shasta County, Cal.
Avery, Geo. D.	Porterville, Tulare County, Cal.
Barbour, Frank	Stockton, San Joaquin County, Cal.
Bowen, Marshall	Hemlock, Mendocino County, Cal.
Briggs, Mrs. Anna E.	Hollister, San Benito County, Cal.
Bryant, L. M. (Leaser of Porter Ranch Mine)	Showers Pass, Humboldt County, Cal.

Undeveloped:

Owner or operator	Address
Cleveland, R. L.	Ukiah, Mendocino County, Cal.
Coffee, Frank	Mecca, Riverside County, Cal.
Cole, R. D.	Lindsay, Tulare County, Cal.
Day, Morgan M. (Pennsylvania Mine)	58 N. 15th St., San Jose, Santa Clara County, Cal.
East Rex Exploration Co.	First National Bank Bldg., San Francisco, Cal.
Edman, J. A.	Quincy, Plumas County, Cal.
Elford, E. W. (Moore Creek Mine)	St. Helena, Napa County, Cal.
Fries, Peter	Tres Pinos, San Benito County, Cal.
Garringer, I. D.	Daggett, San Bernardino County, Cal.
Hammond, W. J. & Sons	Patterson, Stanislaus County, Cal.
Hannagan, James (Leased to E. T. Stewart)	Panoche, San Benito County, Cal.
Hobson, W. K.	Cayucos, San Luis Obispo County, Cal.
La Laguna Ranch Co.	Santa Barbara, Santa Barbara County, Cal.
Lewis, Wm.	Tres Pinos, San Benito County, Cal.
Luce, Alonzo of Paskenta; and Apperson, Virgil of Willows (Manganese Peak Mine)	Paskenta, Tehama County, Cal.
Madrid, John	Jamestown, Tuolumne County, Cal.
Matthews, Geo. C. (Formerly Shaw and Matthews Mine)	Cloverdale, Sonoma County, Cal.
McClendon, Walter	Calpella, Mendocino County, Cal.
Phelan Bros.	Cambria, San Luis Obispo County, Cal.
Shields, W. E.; Packwood, C. C. and Keeney, F. W. (Thatcher Creek Mine)	Covelo, Mendocino County, Cal.
Smith, Sidney; and Waldteufel, J. A. (Mt. San Hedron Mine)	Ukiah, Mendocino County, Cal.
Staneusuch, Antonio	San Luis Obispo, San Luis Obispo County, Cal.
Stewart, E. T. (Leases of James Hannigan)	South Dos Palos, Merced County, Cal.
Thurston, D. H. & Benner, C. S. (Elva Mine)	Paskenta, Tehama County, Cal.
Underwood, E. P. & Henderson, L. G.	Barstow, San Bernardino County, Cal.
Waldteufel, J. A., attorney for G. E. Cameron of Pittsburgh (Wild Devil Mine)	Ukiah, Mendocino County, Cal.
Wallace, Grace P.	No. 164 E. San Carlos St., San Jose, Santa Clara County, Cal.

Manganese Consumers.

In the proper development of any industry it is of course necessary not only that the buyer be advised as to the proper source of the material which will meet his requirements, but also that the producer have adequate information regarding the demand for his raw material, specifications which he may be called upon to meet, and consumers with whom he may get in touch by way of offering his product for sale. In the effort to secure authoritative information in this regard, a copy of the following letter was sent to every buyer and consumer of manganese of the United States whose name was known to this office:

Dear Sir: There is now being completed, under my direction, a detailed survey of California's manganese deposits. At an early date the data thus collected will be issued in printed form.

In order to make this report of the utmost possible value to all concerned at this time of national stress, I am planning to include a list of all firms in the United States who are in the market for this class of material, as well as a list of producers and owners of deposits. If you have no objection to the use of your name in this

connection, an early reply will be appreciated, giving as much of the following information relative to the subject in hand as is consistent with your business policies:

1. Principal use to which you put the material.
2. Specifications covering tenor of ore which will meet your requirements.
3. Form of contract which you demand of the producer.
4. Approximate amount of ore you expect to be in the market for.

It is believed that the dissemination of information of this character will benefit both the user and the producer, and you are assured that your courtesy in complying with the above request will be sincerely appreciated.

(Signed)

FLETCHER HAMILTON,
State Mineralogist.

Very full and satisfactory replies were received from the great majority of buyers to whom this letter was sent, and their cooperation is hereby gratefully acknowledged.

The following mentioned consumers do not, of course, make up the total for the industry in the country, and the opportunity to add the names of additional firms in the final report which will be published on this subject, will be greatly appreciated. A cordial invitation is therefore extended to all companies interested in this business, who have not been in touch with the California State Mining Bureau, to advise the State Mineralogist, Ferry Building, San Francisco, regarding the questions mentioned in the above letter.

There follows an alphabetical list of buyers and consumers, with detailed information regarding the requirements of each, as furnished by their representatives.

LETTERS FROM MANGANESE CONSUMERS.

American Ever Ready Works: 755 Folsom St., San Francisco, Cal.

Aug. 3, 1917.

“We use Dioxide Manganese Ore, principally in the manufacture of dry batteries. Manganese Ore must come within the following specifications:

Minimum 14.72% available oxygen, 80% MnO_2 , maximum 2% iron oxide, not over trace copper or phosphorus.

We have been using some California Manganese as low as 65% MnO_2 , but prefer the higher grades.

With reference to the form of contract which we require, we have no particular forms whatsoever, but require the producer to ship his manganese to San Francisco, where same will be analyzed by any of the reliable chemists of this city, and if found to be up to specifications which are guaranteed by the producer, we immediately pay the invoice.

In regard to the approximate amount of ore we use, this is hard to give you at the present time, as we not only buy for our Pacific Coast factory, but also ship some to our Eastern factories. Our requirements run into the thousands of tons."

The American Metal Company, Limited: 61 Broadway, New York, N. Y.
Aug. 16, 1917.

"Our position in this commodity is that of a dealer, having imported and handled large tonnages both of furnace Manganese and Peroxide of Manganese. If you would therefore incorporate our name in your list accordingly, we should appreciate it."

Bethlehem Steel Company: South Bethlehem, Pa. Aug. 11, 1917.

"*Question No. 1:* The only uses to which we put Manganese are for the manufacture of Spiegel, and of Ferro Manganese. Of course you are aware for the manufacture of Spiegel, a low grade Manganiiferous iron ore can be used, and ores carrying from 15% to 30% of Manganese are usable.

Questions Nos. 2 and 3: Schedule of prices per ton of 2240 pounds for Domestic or Foreign ores, f. o. b. Philadelphia or Sparrows Point.

49% Metallic Manganese,	\$1.00 per unit
46 to 49% Metallic Manganese,	.98 per unit
43 to 46% Metallic Manganese,	.95 per unit
40 to 43% Metallic Manganese,	.91 per unit

Prices are based on ores containing

not more than 8.00% Silica
not more than .20% Phosphorus

and are subject to deductions as follows:

For each 1% in excess of 8.00 Silica, there shall be a deduction of 30 cents per ton, fractions in proportion.

For each .02%, in excess of .20% Phosphorus, there shall be a deduction of 4 cents per unit of Manganese per ton, fractions in proportion.

Ore containing less than 40% Manganese, or more than 12% Silica, or .225 Phosphorus is not acceptable; only purchased at Buyer's option.

Settlements are based on analysis of sample dried at 212 degrees Fahrenheit; the percentage of moisture in the sample as taken to be deducted from the weight.

Question No. 4: We have filled our Manganese requirements for 1917 and 1918. We normally use about 100,000 tons of high grade Manganese Ore annually, and say 70,000 tons of low grade material. By low grade material, I would mean an ore running less than 35% Mn."

Carnegie Steel Company: Pittsburg, Pa. July 31, 1917.

“Replying to your letter of July 25, would say the use to which we put Manganese Ore is the manufacture of Ferro Manganese and Spiegel.

The remainder of your questions are answered by the following price and specification sheet, the last one issued by us, except as to tonnage. This would be a matter of negotiation between shipper and ourselves, but I can say we are large users of high grade Manganese Ore.

We remit in full on receipt of carload and the analysis of the material determined.”

Schedule of prices which will be paid per ton of 2240 pounds for domestic Manganese Ore.

Delivered	{	Lucy Furnaces, Carnegie Steel Company, Pittsburgh, Pa.; Isabella Furnaces, Carnegie Steel Company, Etna, Pa., or South Works, Illinois Steel Company, South Chicago, Ill. Shipments for South Chicago to be routed care of E. J. & E. Ry.
freight		
prepaid		
at		

For ores containing above

49% Metallic Manganese	\$1.00 per unit
46 to 49% Metallic Manganese	.98 per unit
43 to 46% Metallic Manganese	.95 per unit
40 to 43% Metallic Manganese	.90 per unit

Prices are based on ores containing

not more than 8.00% Silica
not more than .20% Phosphorus

and are subject to deductions as follows:

For each 1% in excess of 8.00 Silica, there shall be a deduction of fifteen (15) cents per ton, fractions in proportion.

For each .02% in excess of .20% Phosphorus, there shall be a deduction of two (2) cents per unit of Manganese per ton, fractions in proportion.

Ore containing less than 40% Manganese, or more than 12% Silica, or .225% Phosphorus, subject to acceptance or refusal, Buyer's option.

Settlements are based on analysis of sample dried at 212 degrees Fahrenheit.

The percentage of moisture in the sample as taken to be deducted from the weight.

Prices subject to change without notice unless otherwise specially agreed upon.

Pittsburgh, Pa., May 2, 1917.

Dana & Company, Inc.: 111 Broadway, New York, N. Y. July 31, 1917.

“1. Our principal use of Manganese Ore is to make Ferro Manganese, although we sell a considerable quantity of Chemical ore.

2. The specifications of Metallurgical Ore (Ferro Manganese): 40% Metallic Manganese, 10% maximum Silica, .20% maximum Phosphorus.

We prefer higher Metallic Manganese if possible.

Chemical Ore: Minimum 75%, preferably minimum 80% MnO_2 . Maximum $1\frac{1}{2}\%$ Iron, Maximum .01% Copper.

3. The form of contract we demand from the producer depends entirely on his reliability. If we do not know him and he can not give us satisfactory guarantees as to his business integrity, responsibility and knowledge of mining, we will only pay on certified analysis of a reputable chemist, attached to B/L. In general, we are willing to make a fair contract with a responsible supplier, paying him 75 to 80% of the value of his material at point of shipment.

4. There is no limit to the tonnage we can use either of Chemical ore or Metallurgical.”

The Harshaw, Fuller & Goodwin Co.: Cleveland, Ohio. Aug. 6. 1917.

“In answer to your questions would advise as follows:

First—The Manganese Ore we handle is used principally for the manufacture of dry batteries, although we also supply considerable quantities to glass manufacturers and enamellers.

Second—Prior to the beginning of the war, our specifications for Manganese were minimum 85% Manganese Dioxide, maximum 1% Iron, free from Copper. We obtained ore of this description from the Caucasus. Since the war began, we have been unable to obtain ore of the above description, and have used considerable quantities testing a minimum of 80% MnO_2 , maximum 1.25% Iron, with a slight trace of Copper. The worst feature about California and other western Manganese is the Copper and high Iron contents.

Third. At present we are not making any contracts with producers.

Fourth. Before the war began we were handling about 10,000 tons of Manganese Ore per year. We now handle perhaps 1,000 tons, most of which has been received from Cuba.”

E. J. Lavino & Co.: Bullitt Bldg., Philadelphia, Pa. July 31, 1917.

“In answer to your first question, as to the use to which we put the material; we beg to advise that while we are the largest independent manufacturers of Ferro Manganese in the United States, we are also ore merchants, and while, generally speaking, the Manganese Ore we buy is used in our own furnaces, it might also happen that we would sell some to other Manganese Ore consumers.

Our specifications roughly are as follows:

Ore must be of normal physical condition and must contain no objectionable elements, or at least must not contain in any appreciable quantities any objectionable elements such as copper, lead, zinc, barium, etc.

Metallic Manganese should run as closely to a minimum of 50% as possible, and no ore under 38% in Manganese would be accepted under usual condition.

Silica should be low, averaging as much under 10% as possible, with an outside limit of 13%.

Iron should be just as low as possible, the ideal Manganese Ore for our purpose having no iron in it whatever; 4% is the outside limit we care to accept.

Phosphorus we prefer under .15%, but if necessary can take up to say .25%.

Alumina should be low, anything over 10% being quite objectionable, especially in conjunction with high silica.

It is our custom to impose a penalty on all Silica above 10%, all Iron above 3%, all Phosphorus above .20%. You understand of course, that in certain cases we might make some modifications in our specification, although we consider the limits as given liberal ones, and we are buying large quantities of ore without finding it necessary to make any change.

Question Three, the form of contract which we ask the producer to sign, we have nothing particularly definite in this way. As long as the contract is equitable, and covers all the points agreed to by both parties, we are usually satisfied. One thing on which we do insist, is that final settlement must be based upon sampling and analyzing by Messrs. A. S. McCreath & Son or Messrs. Booth, Garrett & Blair, upon arrival of car at destination.

Question Four, the amount of ore we expect to purchase at the present time, we are buying unlimited quantities and will probably continue to do so for some time."

J. Meyer & Sons: 480 Bourse Bldg., Philadelphia, Pa. Aug. 2, 1917.

"The principal use to which we put this material is for manufacturing glass. We require an ore running from 78 to 85% MnO_2 , with less than 1% of Iron.

Regarding a form of contract, which we would demand from the producer, would state that we would require a contract obligating the producer to forward a definite number of cars at specified intervals.

Regarding the approximate amount of Ore would state that we would go slow at the start, in order to compare this ore, in a practical way, to what we are now using."

The Midvale Steel Company: Pittsburg, Pa. Aug. 1, 1917.

“Referring to your letter July 25th addressed to our Philadelphia office, we beg to reply to your questions as follows:

First—Production of Ferro Manganese.

Second—Desirable to secure ore as high as possible in Manganese and as low as possible in Silica, Iron, Phosphates, etc.

Third—Form of contract not an important matter. We are usually willing to meet most any reasonable terms.

Fourth—Our annual requirements are approximately 50,000 tons and we would be very glad to secure the entire quantity in this country, thereby avoiding the importation of any tonnage from Brazil and India.”

Noble Electric Steel Company: 995 Market St., San Francisco, Cal.

July 27, 1917.

“Our specifications are as follows: Manganese Ore—40% Metallic Manganese; not over 16% Silica.

We have no particular form of contract, but we will not enter into an unbonded contract, without first inspecting the property and making sure that there is some probability that the producers can make good on their contracts.

We expect to be in the market for about five hundred tons of Manganese Ore per month.”

Rogers, Brown & Company: Cortlandt Bldg., 30 Church St., New York, N. Y.

Aug. 3, 1917.

“We shall be glad to have you put our name down in your report as dealers in Manganese Ore. We are not ourselves directly in the manufacturing and smelting end of the business, but act as selling agents for ore producers or as merchants in buying and selling the ore for our own account.

Our principal customers are blast furnaces making Ferro and Spiegeleisen, who require ore running as high as possible in Manganese, not less than 46 or 48%; low in Silica—not over 9% if possible, low in Iron and low in Phosphorus.

As we are not direct consumers, we can not state what amount of ore we expect to be in the market for, but in a general way can assure you that the consumers in this country can use a great deal more high grade ore than it is possible at present to produce in this country.

The domestic production of Ferro Manganese today is in the neighborhood of 27,000 to 28,000 tons per month, requiring more than twice that amount of ore in its production. If British Ferro Manganese continues to be interfered with by the Submarine situation, domestic consumption will call for 800,000 to 1,000,000 tons of Manganese Ore for consumption in this country in 1918, so that you will see there is no

difficulty in selling all the possible output of Domestic Manganese Ore, provided it is of good quality. The difficulty is that so much of our Domestic ore runs very low in Manganese, high in Silica, and the deposits are so pockety and deceptive that there seem to be no properties capable of producing a large and continuous output of high grade ore."

Domestic Manganese Ore Prices and Specifications.

Schedule of Prices Which Will Be Paid Per Ton of 2240 Pounds for Domestic Manganese Ore (Delivered).

For ore containing above 49% Metallic Manganese-----	\$1.00 per unit
46 to 49% Metallic Manganese-----	.98 per unit
43 to 46% Metallic Manganese-----	.95 per unit
40 to 43% Metallic Manganese-----	.90 per unit

Prices are based on ores containing

Not more than 9.00% Silica,

Not more than .20% Phosphorus,

and are subject to deductions as follows:

For each 1% in excess of 9.00% Silica, there shall be a deduction of fifteen (15) cents per ton, fractions in proportion.

For each .02% in excess of .20% Phosphorus, there shall be a deduction of two (2) cents per unit of Manganese per ton, fractions in proportion.

Ore containing less than 40% Manganese, or more than 12% Silica, or .225% Phosphorus, subject to acceptance or refusal, Buyer's option.

Settlements are based on analysis of sample dried at 212 degrees Fahrenheit.

The percentage of moisture in the sample as taken to be deducted from the weight.

Prices subject to change without notice unless otherwise specially agreed upon.

In addition to the foregoing purchasers of manganese, the following list of firms has just been sent out by the U. S. Geological Survey, Washington, D. C., and are included herewith with the idea in view of further broadening the scope of this report.

Purchasers of Manganese and Manganiferous Ores to July, 1917.

- a Purchase manganese ore with more than 40 per cent manganese and less than 1 per cent iron.
- b Purchase manganese ore with more than 40 per cent manganese and more than 1 per cent iron.
- c Purchase manganese ore with less than 40 per cent manganese.

bc N. A. Adler, Batesville, Ark.

a Alleghany Ore & Iron Co., Buena Vista, Va.

a American Carbon & Battery Co., East St. Louis, Ill.

bc American Manganese Mfg. Co., Dunbar, Pa. (362 Bullitt Bldg., Philadelphia, Pa.)

c American Smelting & Refining Co., Murray, Utah.

- b American Steel Foundries Co., Chicago, Ill.
- a Anglo-American Flash Light Co., Pittsburgh, Pa.
- b Basic Metals Co., Pittsburgh, Pa.
- b Berkshire Iron Works, Bullitt Bldg., Philadelphia, Pa.
- ab Binney & Smith, 81 Fulton St., New York, N. Y.
- b Bethlehem Steel Corporation, South Bethlehem, Pa.
- a Arthur B. Bibbins, Baltimore, Md.
- b Bilrowe Alloys Co., Bernice Bldg., Tacoma, Wash.
- ab Chas. A. Burdick, E. M., 74 Broadway, New York, N. Y.
- a C. F. Burgess Laboratories, Madison, Wis.
- b Cambria Steel Co., Pittsburgh, Pa.
- b Carnegie Steel Co., Pittsburgh, Pa.
- bc Central Iron & Coal Co., Holt, Ala.
- bc Charcoal Iron Co., Detroit, Mich.
- c Colorado Fuel & Iron Co., Pueblo, Colo.
- ab W. R. Cuthbert, Lynchburg, Va.
- bc Delaware River Steel Co., Chester, Pa.
- abc W. H. Denison, Cushman, Ark.
- b Electric Reduction Co., Washington, Pa.
- b Eastern Steel Co., Pottsville, Pa.
- b Empire Steel & Iron Co., Catasauqua, Pa.
- bc Eureka Manganese Co., Birmingham, Ala.
- b Fuller & Warren Co., Troy, N. Y.
- ab Robert Gilchrist, Elizabethtown, N. J.
- b Goldschmidt Thermit Co., New York, N. Y.
- bc R. L. Handford, Cushman, Ark.
- a Harshaw, Fuller & Goodwin Co., Electric Bldg., Cleveland, Ohio.
- a Hazel-Atlas Glass Co., Clarksburg, W. Va.
- bc Hickman, Williams & Co., St. Louis, Mo.
- ab C. W. Hill Chemical Co., Los Angeles, Cal.
- a Illinois Glass Co., Alton, Ill.
- a Illinois Pacific Glass Co., San Francisco, Cal.
- b Illinois Steel Co., South Chicago, Ill.
- c International Smelting Co., Salt Lake City, Utah.
- b Jones & Laughlin Steel Co., Pittsburgh, Pa.
- b Juniata Furnace & Foundry Co., 30 West Girard Ave., Philadelphia, Pa.
- b Lackawanna Iron & Steel Co., U. S. Express Bldg., Buffalo, N. Y.
- a J. S. Lamson & Bro., Inc., 80 Maiden Lane, New York, N. Y.
- b Lebanon Blast Furnace Co., Lebanon, Pa.
- b E. J. Lavino & Co., Bullitt Bldg., Philadelphia, Pa.
- ab David Loeser, 1400 Broadway, New York, N. Y.
- ab Los Angeles Pressed Brick Co., Los Angeles, Cal.
- bc Lowmoor Iron Co. of Virginia, Lowmoor, Va.
- bc Manganese Products Co., 30 East 42nd St., New York, N. Y.
- a Manhattan Electrical Supply Co., 41-47 Morris St., Jersey City, N. J.
- abc Miami Metals Co., Peoples Gas Bldg., Chicago, Ill.
- bc National Alloy Co., Philadelphia, Pa.
- a National Carbon Co., Cleveland, Ohio.
- bc Noble Electric Steel Co., Heroult, Cal. (995 Market St., San Francisco, Cal.)
- ab Oakley Paint Mfg. Co., Los Angeles, Cal.
- b Pacific Coast Steel Co., Seattle, Wash.
- ab Pacific Sewer Pipe Co., Los Angeles, Cal.
- b Pittsburgh Lamp Brass & Glass Co., Pittsburgh, Pa.
- b Pittsburgh Steel Co., Pittsburgh, Pa.
- c Pulaski Iron Co., Pulaski, Va.
- ab A. P. Rice, Spencer, Ohio.
- b Ricketson Mineral Paints Works, Milwaukee, Wis.
- ab Rogers Brown Co., New York, N. Y.

- bc Frank Samuel, Philadelphia, Pa.
 - bc Seaboard Manganese & Steel Corporation, Temple, Pa.
 - ab Arthur Seligman, 165 Broadway, New York, N. Y.
 - bc Sligo Furnace Co., Sligo, Mo.
 - bc Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.
 - bc Southern Manganese Corporation, Anniston, Ala.
 - ab Oscar Stromberg, Tribune Bldg., New York, N. Y.
 - bc Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
 - a U. S. Glass Co., Pittsburgh, Pa.
 - c United States Smelting, Refining & Mining Co., Salt Lake City, Utah.
 - b Utah Iron & Steel Co., Salt Lake City, Utah.
 - bc U. S. Steel Corporation, Pittsburgh, Pa.; South Chicago, Ill.; Birmingham, Ala.
 - b Vanadium Steel Alloys Co., Latrobe, Pa.
- Many other makers of flint glass and dry batteries use ore of grade a.

CHAPTER II.

CHROMIUM.

Occurrence.

The characteristic occurrence of chromium in California is as the black oxide chromite which usually carries more or less iron and magnesium. The ore bodies are usually lenticular or chimney-shaped and occupy openings along fracture planes in peridotite or serpentine. It also occurs along contacts between serpentine and slate or other rock. On account of the continuity of some fractures the ore appears as veins filling them.

On account of the persistent association of chromite with serpentine rocks, the areas in which ore may be expected to occur are easily outlined. One belt follows the Coast Ranges, while another follows the Sierra Nevada Mountains. Up to 1916, California has been the only state in the Union where this ore has been mined on a commercial scale.

Concentration.

Large amounts of low grade chromite are necessarily mined along with commercially valuable ores. This material has, until recently, been rejected and piled on the dumps. The concentration of this material is now under way. One mill is under construction near Patterson, Stanislaus County, by the Chrome Concentrating Company of San Francisco, while a second, the Placer Chrome Concentrating Company of Newcastle, made a trial run about October 1st. A photograph and brief description of the latter mill follows:



Placer Chrome Concentrating Co. mill, near Rattlesnake Bar, El Dorado Co., Cal. (Photo by C. A. Waring.)

The mill of the Placer Chrome Concentrating Company is located one quarter mile south of Rattlesnake Bridge in El Dorado County, and eight miles southeast of Newcastle, Placer County. Ore is trucked a mile and a quarter from a bin at the foot of the mine tramway. Equipment consists of a 4'x6' grizzly, 8"x12" Blake crusher, Hendy self-feeder, 4'x5' ball mill, 2 Deister-Overstrom Concentrators and 1 Deister-Simplex Sand Concentrator. The mill and crusher are operated by a 20 h. p. Fairbanks Morse distillate engine, while the tables and generator for lights are driven by a 4 h. p. distillate engine. A 6 h. p. engine pumps water from the Middle Fork of the American River.

A trial run of short duration on 20% ore, with the tables imperfectly regulated, yielded a 40% concentrate and leaving 10% of chromic oxide in the tailings. The concentrates showed a tendency to cake on the tables, to remedy which the operator intended to speed up the tables. There was also a tendency for the ore to slime, which could probably be remedied only by substituting rolls for the ball mill.

Uses.

Like manganese, chromium owes its present important position in the mineral industry of California to the conditions arising from the war. Most of the chromite used in the United States finds a market on the Atlantic Seaboard or in the Middle West. The supply was normally imported from South Africa, Asia Minor, etc. The major consumption of chromite is for use as a refractory lining in furnaces for smelting steel and copper. Lesser amounts go into the manufacture of ferro-chrome for chrome-steel alloys.

Price.

Previous to the present war conditions the bulk of the chrome produced was valued at from \$8 to \$12 per ton. Quotations, f. o. b. California, as of October 16, 1917, were 50 to 60 cents per unit for 34 to 40 per cent ore, with the limit of free SiO_2 being placed at 8%.

Freight Rates.

The principal markets for this product are in the vicinity of St. Louis, Chicago, Pittsburgh and New York. Freight tariffs to the former cities are approximately \$10 per ton and to the Eastern Seaboard, \$14.86. This fact must be kept in mind in connection with the variance in quotations for chrome, which will sometimes be noted as between Eastern and Western sources.

OWNERS AND OPERATORS OF CHROME DEPOSITS IN CALIFORNIA.

Producing:

Name.	Address.
Agard & Stewart	268 Market St., San Francisco, Cal.
Alexander, F. A.	225 Monadnock Bldg., San Francisco, Cal.
American Exploration Company (lease of Tyson Mining Co.)	Grants Pass, Oregon.
Austin, H. C.	Georgetown, El Dorado County, Cal.
Biggs, H. C.	2718 California St., San Francisco, Cal.
Bingham, Alonzo	Callahan, Siskiyou County, Cal.
Brewer, Florence and Dennis, A. S. (property in Trinity County leased to Federal Chrome Co.)	Red Bluff, Tehama County, Cal.
Bunker, H. H.	Michigan Bluff, Placer County, Cal.
Calhoun, Frank, Locating Co.	200 Phelan Bldg., San Francisco, Cal.
Carson, Frank	Visalia, Tulare County, Cal.
Chaix, S.	Latrobe, El Dorado County, Cal.
Clary, Harry	Angels, Calaveras County, Cal.
Crisle-Riffe Chrome Mine	Kings River, via Sanger, Fresno County, Cal.
Curran, W. E.	Sanger, Fresno County, Cal.
Davis, John	Copperopolis, Calaveras County, Cal.
Dibblee & Arata	San Luis Obispo, San Luis Obispo County, Cal.
Dolbear, S. H. (for American Refractories Co.)	1411 Merchants National Bank Bldg., San Francisco, Cal.
Dougherty, C. F.	Strathmore, Siskiyou County, Cal.
Driesbach, F. M.	2101 E. 12th St., Oakland, Alameda County, Cal.
Farish Company, Inc.	Insurance Exchange Bldg., San Francisco, Cal.
Farmer, R. H. (Placer Chrome Co.)	Newcastle, Placer County, Cal.
Fenster, G. C. & Lehow, W. S. (Leased to C. H. Holbrook, W. L. McGuire & H. E. Springer)	Crocker Bldg., San Francisco, Cal.
Fuqua, T. F. & Bell, R. E.	Lower Lake, Lake County, Cal.
Graham, W. S.	Ukiah, Mendocino County, Cal.
Gravlin Chrome Mine	Grants Pass, Oregon
Green, W. C.	Georgetown, El Dorado County, Cal.
Healdsburg Mineral Co.	Healdsburg, Sonoma County, Cal.
Hill, S. W.	Red Bluff, Tehama County, Cal.
Hollister, Wm.	San Luis Obispo, San Luis Obispo County, Cal.
Hothersall, Geo. J.	Nevada City, Nevada County, Cal.
Joerger, Martha	Oakland, Alameda County, Cal.
Johnson, G. S. & Co.	Phelan Bldg., San Francisco, Cal.
Kleinsorge, W. E.	605 Peoples Bank Bldg., Sacramento, Cal.
Lambert, N.	Megalia, Butte County, Cal.
Levensaler-Speir	Monadnock Bldg., San Francisco, Cal.
Mackey, Peter	Jamestown, Tuolumne County, Cal.
Madrid, John	Angels Camp, Calaveras County, Cal.
Maltby, C. S.	1311 Humboldt Bank Bldg., San Francisco, Cal.
Marianno, J. F.	Box 6, Chinese, Tuolumne County, Cal.
Masterson, T. F. & A. C.	Callahan, Siskiyou County, Cal.
McFaul, J.	Angels, Calaveras County, Cal.
Meyer, Fred	Weimar, Placer County, Cal.
Mineral Products Co.	334 Rialto Bldg., San Francisco, Cal.
Mineral Resource Company of America (care of Ralph E. Hyatt)	Hughes Hotel, Fresno, Fresno County, Cal.
Neill, Thomas	Pope Valley, Napa County, Cal.
Newman Chrome Mine	Livermore, Alameda County, Cal.
Nichelini, A.	Chiles, Napa County, Cal.
Nielsen, G. W. & Donnelly, P.	Folsom, Sacramento County, Cal.
Noble Electric Steel Co.	995 Market St., San Francisco, Cal.

Norcross, D. C.	430 California St., San Francisco, Cal.
O'Brien, Jas., Peter Hoff & Chas. Ybright	Latrobe, El Dorado County, Cal.
Peri, Frank	Copperopolis, Calaveras County, Cal.
Pierce & Benadom	Morro, San Luis Obispo County, Cal.
Pilliken, George	Folsom, Sacramento County, Cal.
Power Timber Co.	Call Bldg., San Francisco, Cal.
Rhodes, L. H.; Gribble, C. N. & Byle, B. J.	Coalinga, Fresno County, Cal.
Richards, Geo. A. & Thos.	Oakdale, Tuolumne County, Cal.
Roeper, J. C.	Independence, Inyo County, Cal.
Ryan, Thomas	Copperopolis, Calaveras County, Cal.
Sanger Mining Co.	Sanger, Fresno County, Cal.
Solinsky, F. J.	729 New Call Bldg., San Francisco, Cal.
Sullivan, D. J.; Hemphill, W. F. & Noble, R. E.	Dutch Flat, Placer County, Cal.
Tedoc Mining Co. (lease of Chas. Carpey & Jas. Brown)	268 Market St., San Francisco, Cal.
Trinidad Mining Co.	214 Front St., San Francisco, Cal.
Tucker, Henry (leases of Newhall Estate)	Calistoga, Lake County, Cal.
Turner, R. Chester	Grass Valley, Nevada County, Cal.
Turner, R. L. & Geisendorfer, C. A.	Colfax, Placer County, Cal.
Tyson Mining Co.	Tyson Bldg., Baltimore, Md.
Union Chrome Co.	Adams Bldg., 180 Sutter St., San Francisco, Cal.
Wait, A. L.	Plymouth, Amador County, Cal.
Walsh, Guy and Hall	Auburn, Placer County, Cal.
Ward, Geo.	Fosteria, Calaveras County, Cal.
Waters, Chas.	San Luis Obispo, San Luis Obispo County, Cal.
Wellman, Scott I.	3603 Finley Ave., Los Angeles, Los Angeles County, Cal.
Wheeler, A. A.	1640 Clay St., San Francisco, Cal.
Williamson, Bros. & Cole, C.	Washington, Nevada County, Cal.
Williamson, O. S. & Beck, C.	Iowa Hill, Placer County, Cal.
Wilson, Fred	Angels, Calaveras County, Cal.

Developed:

Name.	Address.
Asbil, Frank; Guthrie, Alex & Root, Mrs. Frank	Cummings, Mendocino County, Cal.
Aumaier, S.	San Luis Obispo, San Luis Obispo County, Cal.
Auspach, Wm. & Hay, E. K.	Dunsmuir, Siskiyou County, Cal.
Baldwin, W. T.	Telephone Bldg., Oroville, Butte County, Cal.
Bonetti, Chas.	Latrobe, El Dorado County, Cal.
Bowman, B. M. (lessee of Parmeter Ranch)	Cazadero, Sonoma County, Cal.
Boyden, W. P. & Koenig, Fred	Greenville, Plumas County, Cal.
Brandon, J.	Latrobe, El Dorado County, Cal.
Burnham, Wm.	Copperopolis, Calaveras County, Cal.
California Chrome Co.	Kohl Bldg., San Francisco, Cal.
Campbell, Mrs. A. B.	Angels, Calaveras County, Cal.
Carr, E. H. & Mefford, J. E.	Ione, Amador County, Cal.
Carson, Frank & Sweet	Visalia, Tulare County, Cal.
Courtwright, Geo.	Ione, Amador County, Cal.
Curtis Bros.	Pentz, via Oroville, Butte County, Cal.
De Kruse, E.	Iowa Hill, Placer County, Cal.
Dooley, E. A.	Plymouth, Amador County, Cal.
Dwyer, J. F.	Yreka, Siskiyou County, Cal.
Fish, C. E.	Red Bluff, Tehama County, Cal.
Fleishbein, L. & Kinney, L.	Mormon House via Folsom, Sacramento County, Cal.
Franks, J. R.	Piedra, Fresno County, Cal.
Hall, George	Greenville, Plumas County, Cal.
Hallingreen, Miss L. (property leased to Shanks & Copps)	Geyserville, Sonoma County, Cal.

Developed:

Name.	Address.
Harp & Sons-----	Middletown, Lake County, Cal.
Hogan, Tom-----	Grass Valley, Nevada County, Cal.
Irish, C. F.-----	Georgetown, El Dorado County, Cal.
Kelley, M. A.-----	Auburn, Placer County, Cal.
Kilday, M. J.-----	Los Gatos, Santa Clara County, Cal.
Kohl, Joseph-----	Jamestown, Tuolumne County, Cal.
Linder, R. E. & Hodges, J. R.-----	Alta, Placer County, Cal.
Luce, Alonzo-----	333 N. Butte St., Willows, Glenn County, Cal.
Madiera, Geo., Sr.-----	Healdsburg, Sonoma County, Cal.
Maki, Peter-----	Jamestown, Tuolumne County, Cal.
Marton, Chas. & Boyer, Leon-----	Bayles, Shasta County, Cal.
McBride, Geo. & Masterson, C. J.-----	Callahan, Siskiyou County, Cal.
McCarty, Thos.-----	Quincy, Plumas County, Cal.
McCormick Cattle Co.-----	Sonora, Tuolumne County, Cal.
Mefford, J. E.-----	Ione, Amador County, Cal.
Mountain Springs Chrome Co.-----	Ione, Amador County, Cal.
Muscatelli, Bob-----	Washington, Nevada County, Cal.
Niles, Walter; Miller, Fred & H. O. Kohler-----	Washington, Nevada County, Cal.
Ogle, E. C. & W. H.-----	Volcanoville, via Georgetown, El Dorado County, Cal.
Osborn, S. P.-----	Altaville, Calaveras County, Cal.
Parkhurst, Herbert N.-----	110 20th St., Pacific Grove, Monterey County, Cal.
Parmeter Ranch Mine-----	Cazadero, Sonoma County, Cal.
Perera, Wm. M.-----	Jamestown, Tuolumne County, Cal.
Pfeifer, Wm.-----	Latrobe, El Dorado County, Cal.
Phillips, George-----	Yreka, Siskiyou County, Cal.
Philpott, Chas.-----	Hayfork, Trinity County, Cal.
Preston Estate-----	Jamestown, Tuolumne County, Cal.
Roeper, J. C.-----	Independence, Inyo County, Cal.
Rohrer, G. C.-----	Pulga, Butte County, Cal.
Rowen, R. J.-----	Grants Pass, Oregon
Schular & Doolittle-----	Happy Camp, Siskiyou County, Cal.
Scott, Geo.-----	Washington, Nevada County, Cal.
Sheldon, Geo. F.-----	302 Key Route Bldg., Oakland, Alameda County, Cal.
Shroeder, H. & Thompson, E. H.-----	Grass Valley, Nevada County, Cal.
Siebert, John-----	Sanger, Fresno, County, Cal.
Sims, Henry-----	Chinese Camp, Tuolumne County, Cal.
Swayne, R. H.-----	430 Sansome St., San Francisco, Cal.
Sweet, John-----	Wolf, Nevada County, Cal.
Thompson, H.-----	Wolf, Nevada County, Cal.
Vogelsang, Charles J.-----	North Branch, Calaveras County, Cal.
Waddell, E. H.-----	Lindsay, Tulare County, Cal.
Walker, O. J.-----	Callahan, Siskiyou County, Cal.
Wear, E. T.-----	Paso Robles, San Luis Obispo County, Cal.
Welsh, Joseph C.-----	San Luis Obispo, San Luis Obispo County, Cal.
Wiley, D. E.-----	Folsom, Sacramento County, Cal.
Woods, Blaisdel & McGinn-----	Sanger, Star Route, Fresno County, Cal.
Wurtzer & Mezger-----	Yreka, Siskiyou County, Cal.
Zerfing, Arthur-----	Cayucos, San Luis Obispo County, Cal.

Undeveloped:

Name.	Address.
Artward, Chas.; Kindred, Geo. & McKnight, J. M.-----	Covelo, Mendocino County, Cal.
Asbil, Frank-----	Alderpoint, Mendocino County, Cal.
Beckwith, Robert-----	Jamestown, Tuolumne County, Cal.
Burrows, I. A.-----	Newville, Glenn County, Cal.
Chesley, W. R.-----	Willows, Glenn County, Cal.
Childers, W. L. et al.-----	Crescent City, Del Norte County, Cal.

Undeveloped:

Name.	Address.
Collier, B. K.	Dunsmuir, Siskiyou County, Cal.
Copsey, A.; Moore, W. P. & Klein, H. J.	Middletown, Lake County, Cal.
Cory, W. C.	Jamestown, Tuolumne County, Cal.
Dotta, Mrs. L. H. & Sons	Healdsburg, Sonoma County, Cal.
Evans, W. J.	San Simeon, San Luis Obispo County, Cal.
Ferbrache, J. A.	Gilroy, Santa Clara County, Cal.
Folger, A. J. & Holbert, C. M.	Beegum, Tehama County, Cal.
Forni, J. C.	Latrobe, El Dorado County, Cal.
Garcia, Marcel & Estrada, Francisco J.	San Simeon, San Luis Obispo County, Cal.
Gill, Charles D.	Campbell, Santa Clara County, Cal.
Glenn, P. E.	Latrobe, El Dorado County, Cal.
Hallister, W. M. & Pierce, W.	San Luis Obispo, San Luis Obispo County, Cal.
Hawkins, E. J. et al.	Crescent City, Del Norte County, Cal.
Hay, E. K. & Auspach, Wm.	Dunsmuir, Siskiyou County, Cal.
Hearst, Mrs. Phoebe	San Francisco, Cal.
Jolie, Geo. M.	San Luis Obispo, San Luis Obispo County, Cal.
Johnson, Wm.	Castella, Shasta County, Cal.
Keller, A. D.	Graniteville, Nevada County, Cal.
Kilpatrick, W., agent for Sullinger property	Oakville, Napa County, Cal.
La Laguna Ranch Co.	320 Chamber of Commerce Bldg., San Diego, Cal.
Middlemast, W. C.	Cayucos, San Luis Obispo County, Cal.
Miles, D. E. & Westover, Wm.	Hazel Creek, Shasta County, Cal.
Mott, Geo. L. & Gamble, T. B.	San Luis Obispo, San Luis Obispo County, Cal.
Murphy, P. B.	Latrobe, El Dorado County, Cal.
Osburn, S. P.	Altaville, Calaveras County, Cal.
Russ, Antoine D.	San Luis Obispo, San Luis Obispo County, Cal.
Shields, W. E.	Covelo, Mendocino County, Cal.
Snyder, R. S.	Piedra, Fresno County, Cal.
Steele, T.	Arroyo Grande, San Luis Obispo County, Cal.
Vaughn, Mrs. Zona of Turlock (property leased to Fenster, G. L.)	-----
	Patterson, Stanislaus County, Cal.
Wallace, Roy W.	Pope Valley, Napa County, Cal.
Wells, Conklin & Williams, Ed	Newville, Glenn County, Cal.
Wheeler, James	Santa Margarita, San Luis Obispo County, Cal.

Chromite Buyers and Consumers.

In the effort to get in touch with consumers similar methods were used as those described on page 10 with reference to manganese. All firms known to the Mining Bureau were communicated with, a statement relative to the Bureau's aims as to the issuance of the report in hand was given, and information asked covering the requirements of each in the purchase of this ore.

Prompt and satisfactory compliance with this request was received almost without exception, and it is with pleasure that the hearty cooperation thus received is hereby acknowledged.

Extracts from letters received follow, which, it is believed, will furnish an authoritative and helpful guide to producers and owners of chromite deposits throughout the state.

LETTERS FROM CHROME BUYERS.

American Refractories Company: Joliet, Ill. July 30, 1917.

(Samuel H. Dolbear, Pacific Coast Representative, Merchants National Bank Building, San Francisco.)

First—Our receipts of chrome ore are almost entirely made up into bricks for refractory purposes.

Second—Our analysis specifications at present are 40% to 50% Cr_2O_3 ; not over 15% Fe_2O_3 , and not over 8% SiO_2 .

Third—We have no fixed form of contract under which purchases are made, but as a rule stipulate a specific tonnage contingent upon the deposit producing it and for delivery within a specific period; terms of payment usually being 80% sight draft with bill of lading attached; the balance payable upon delivery of car; sampling and analysis at destination. Where the seller is willing to have his shipments sampled and analyzed by a reputable chemist at the time of loading, we would even be willing to pay sight draft for full value, based on that analysis.

Fourth—It is very difficult to give you any indication as to the amount of ore that we would be in the market for, as you will receive no doubt, a number of replies to your inquiries and a great deal of the tonnage will be duplicated.

Binney & Smith: 81 Fulton St., New York, N. Y. July 30, 1917.

Replying to yours of the 24th inst. regarding Chromite, the chief use we have for the material in question is in the manufacture of Chrome colors, Ferro Chromium and refractories. We need about 500 tons of ore of over 50% Cr_2O_3 and under 3% in Silica annually while the war lasts. We can take all the chrome we can get 38 to 40% Cr_2O_3 .

Electro Metallurgical Company: 42d St. Bldg., New York, N. Y.

Aug. 9, 1917.

(1) Question: Principal use to which we put the material.

Answer: In the production of steel.

(2) Question: Specifications covering tenor of ore which will meet our requirements.

Answer: High grade.

(3) Question: Form of contract which we demand of the producer.

Answer: No particular form.

(4) Question: Approximate amount of ore we expect to be in the market for.

Answer: All we can obtain at a reasonable price.

Foote Mineral Company: 107 N. 19th St., Philadelphia, Pa. Aug. 3, 1917.

1. Principal Uses: Manufacture of Ferrochrome and bichromate.

2. Specifications: Chemical ore (for manufacture of bichromate): Cr_2O_3 minimum 50%, Silica maximum 6%; Metallurgical Ore: Cr_2O_3 minimum 40%, Silica maximum 5%, Sulphur maximum .5%, Phosphorus maximum .2%.

3. Contracts. The ore is generally purchased on the basis of so much per unit of Cr_2O_3 present per net ton. For example, ore quoted at 80¢ per unit on the basis of a minimum of 50% Cr_2O_3 , would be worth \$40.00 per net ton f. o. b. Eastern points. Payment is generally made on the basis of 80% against bill of lading with preliminary certificate of sampling and analysis by a Western chemist. Final payment would be made on the basis of Booth, Garrett & Blair's or Ledoux & Co.'s certificate of sampling and analysis after the arrival of the ore in the East.

In regard to the fourth question, it is impossible for us to give you any exact information, as our requirements vary from month to month.

Goldschmidt Thermit Company: New York City, 120 Broadway.

Aug. 24, 1917.

1. The principal use for which we require California Chrome Ore is the making of 60% Carbon-free Ferro Chromium.

2. We prefer the ore to be over 50% Cr_2O_3 , less than $1\frac{1}{2}\%$ SiO_2 and only trace of S and P and containing no injurious metals.

3. The contract form which we prefer is one covering all possible points between buyer and seller, such as specifications, delivery, quantities, etc., etc., and we prefer to pay 100% on the dry weight after weighing, sampling and analysis by third and independent party whose results are final.

4. We would probably require at least 10 to 20 carloads per year.

Harbison-Walker Refractories Company: Farmers Bank Bldg., Pittsburg, Pa. July 30, 1917.

We beg to reply to the questions in your letter of the 24th inst. as follows:

1. Principal use: Brick making.

2. Specifications: Cr_2O_3 not under 40%.

SiO_2 not over 6%.

Fe_2O_3 not over 15%.

3. Form of contract: 80% against sight draft with bill of lading and certificate of analysis attached; balance on determination of quality of ore after arrival.

4. Amount in market for: Can not state. Large user.

Mutual Chemical Co. of America: 55 John St., New York, N. Y.

July 30, 1917.

1. The use to which we put Chrome Ore is in the manufacture of Bichromate of Potash and Bichromate of Soda.

2. All we use should analyze a minimum of 48% Chromic Oxide and maximum of 6% Silica.

3. The form of contract depends upon whether it is a buyer's or seller's market. We buy as well as we can, and on the best terms possible, generally delivered at our works, weighed and sampled at time of discharging, and settlement on sampling and analysis of Messrs. Ledoux & Company's laboratory.

4. We believe we are the largest consumers of Chrome Ore in this country. We do not care to state our consumption.

The National Electrolytic Co.: Niagara Falls, N. Y. Aug. 17, 1917.

Referring to your letter of July 24th, which has been overlooked, we can use 10,000 tons Chrome Ore per annum in the manufacture of Bichromates. We prefer to have ore testing about 50% Cr_2O_3 .

Noble Electric Steel Company: 995 Market St., San Francisco, Cal.

July 27, 1917.

Our specifications are as follows:

Chrome Ore—30% Metallic Chromium, not over 10% Silica.

We have no particular form of contract, but we will not enter into an unbonded contract, without first inspecting the property and making sure that there is some probability that the producers can make good on their contracts.

We expect to be in the market for possibly 200 tons of Chrome Ore per month.

Pacific Electro Metals Company: Balboa Bldg., San Francisco, Cal.

July 25, 1917.

We are in the market for a limited amount of chrome ore, for the purpose of manufacturing ferro chromium from the same.

As to specifications of ore which we would use, beg to state that we would insist on a low silica content and as high metallic chromium content as possible.

The form of contract which we would demand of the producer would be one based on guaranteed minimum of metallic chromium and maximum silica. We would most likely be willing to pay some premium for ores better than the quality contracted for. Our demands would be approximately one hundred tons of ore per month.

St. Louis Refractories Company: Title Guaranty Bldg., St. Louis, Mo.

Aug. 4, 1917.

Replying to your recent favor, relative to Chrome, will state that we intend to make some Chrome Brick, but have not an opening for it in our plant just at present, but we do handle Chrome Ore, and are in the market for about 1,000 tons of 34% to 40%.

The Sawyer Tanning Company: Napa, Cal. July 28, 1917.

Replying to your questions:

(1) All Chromite purchased by us is used in the production of Bichromate of Soda in our factory at Napa.

(2) We can use Chromite only when containing 47% or more of Chromic Oxide and not over 8% of Silica.

(3) We have no particular form of contract with the producers.

(4) We expect to be in the market for 2,000 tons of ore yearly.

PUBLICATIONS OF THE CALIFORNIA STATE MINING BUREAU

Publications of this Bureau upon which a price has been affixed will be sent on receipt of the requisite amount. Others will be mailed upon request until the edition is exhausted. Only stamps, coin or money orders will be accepted in payment.

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*Inyo County-----	----
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*Plumas County-----	----
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*Shasta County-----	----
*Sierra County-----	----
*Siskiyou County-----	----
*Trinity County-----	----
*Tuolumne County-----	----
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*Mineral and Relief Map of California-----	----
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Madera County, Showing Boundaries of National Forests-----	.20
Placer County, Showing Boundaries of National Forests-----	.20
Shasta County, Showing Boundaries of National Forests-----	.20
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Calaveras County-----	.25
Plumas County-----	.25
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Geological Map of California (mounted)—50x60 inches-----	2.50

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Samples (limited to three at one time) of any mineral found in the state may be sent to the Bureau for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the state. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

